

**DEVELOPING COMPARATIVE PERFORMANCE MEASURES FOR THE
SALT LAKE CITY FIRE DEPARTMENT**

EXECUTIVE DEVELOPMENT

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ABSTRACT

Fire departments must measure their performance and compare themselves with other fire departments to determine whether they are being effective and efficient. The problem was that the Salt Lake City Fire Department (SLCFD) did not have a performance measurement system that permitted a comparison with other fire departments. The purpose of this applied research project was to evaluate the SLCFD's current performance measurement system, recommend a set of measures to permit comparison, and to compare the SLCFD with other cities on those performance measures.

The research questions were:

1. How useful is the SLCFD's current performance measurement system in allowing comparison with other fire departments?
2. What performance measures could be used to compare the SLCFD with other fire departments?
3. How does the SLCFD compare to other fire departments on these performance measures?

Procedures included a literature review, a compilation of suggested performance measures, the use of existing survey data, the identification of performance measures, and the comparison of the SLCFD with other fire departments.

The results of the study included several new performance measures. In comparison, the SLCFD was better than average in fire deaths and losses and worse than

average in fire injuries. Conflicting results were obtained from workload and efficiency indicators.

Recommendations included revising the performance measurement system to include outcome data, expanding measures to include economic data, selecting other cities for comparison, conducting full-scale benchmarking, conducting a standards of coverage analysis, and supporting the development of a national data base for fire service information.

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INTRODUCTION

Public agencies face enormous pressure to prove that they are effective and efficient. The tax limitation movement of the 1970s and the dramatic reduction in federal aid in the 1980s have given way to more subtle mandates for government agencies to demonstrate that they are producing results. While more recent developments lack the drama of a tax revolt, they are no less effective in creating change in public agencies.

Performance measurement lies at the heart of this issue. Agencies must develop and implement performance measures, which will allow both managers inside the agency and interested persons outside the agency to assess whether it is fulfilling its mission.

The Salt Lake City Fire Department (SLCFD) implemented a performance measurement system in 1998 as part of a citywide strategic planning and total quality service initiative. Performance measures include indicators relating to financial health, customer service, effectiveness and efficiency, and workforce quality. The SLCFD collects and reports the measurements every month and the city budget contains a full report for the previous fiscal year.

While the city has made major advances in performance measurement, further improvements are needed.

The problem that is addressed by this research project is that the SLCFD does not have a performance measurement system that will permit comparison with other fire departments.

The purpose of this research project is to evaluate the SLCFD's current performance measurement system, to develop a set of performance measures that will permit comparison with other fire departments, and to use those measures to evaluate the

SLCFD. The project employed an evaluation research model to answer the following research questions:

1. How useful is the SLCFD's current performance measurement system in allowing comparison with other fire departments?
2. What performance measures could be used to compare the SLCFD with other fire departments?
3. How does the SLCFD's performance compare to other fire departments on these performance measures?

This research project involved an extensive literature review of a number of public administration books and journal articles. It also used the results of the Phoenix (Arizona) Fire Department's "Survey of US and Canadian Fire Departments" to assist in developing a set of comparative performance measures. After presenting and discussing the results of these procedures, the paper concludes with a set of recommendations to improve the SLCFD's performance measurement system.

BACKGROUND AND SIGNIFICANCE

Performance measurement is not a new development for local governments. Fischer (1994) cites a 1938 publication of the International City Management Association on measuring municipal activities. The SLCFD has produced an annual report of fires, dollar losses, deaths, and injuries since 1940. Insurance industry ratings of fire departments have commanded the attention of fire officials and city managers for most of the twentieth century.

Despite these early efforts to quantify public sector activities, performance measurement remained an elusive goal. Stanley (1964) lamented the lack of information on the performance of individuals and organizations.

It is rare, however, that we get to the question of the quality of people and the quality of their performance. We tend to deal with a fusion of folklore, assertions and surface logic. Lacking more real evidence, it is hard to do otherwise. (p. 174)

Several developments have created a renewed interest in performance measurement. Perhaps the most significant force is the demand that agencies face from citizens and political leaders for accountability in fulfilling their mission. Public agencies often do not face the same competitive market pressures as private industries. However, public agencies must compete for funding in an environment marked by fiscal austerity. This circumstance forces agency managers to use a variety of tools to assure their agency's survival. Poister and Streib (1994) describe the evolution of several management tools in municipal governments from 1976 to 1993. They report that the percentage of local governments using "performance monitoring" rose from 30% to 70% in that time period.

Several authors have focused on the benefits of performance measurement. Greiner (1996) cites improved performance, enhanced motivation, improved communications and strengthened accountability. The Center for Performance Measurement (1998) cites several advantages of performance measurement, including increased accountability, improved management, and better resource allocation. Ammons (1996b, pp. 10-11) lists several reasons for measuring performance, including accountability, planning and budgeting, operational improvement, program evaluation,

performance appraisal, reallocation of resources, directing operations, and contract monitoring. O'Toole and Stipak (1996) detail the experience of Portland, Oregon, which has used performance measurement since 1991. They take a generally positive view of the city's efforts, citing the usefulness of survey data in assessing needs in different neighborhoods. Portland's system is also used as a decision tool for city commissioners.

Several authors link performance measurement to the budget. Timmey (1996) reviews an energy management program in Philadelphia and recommends integrating performance measurement into the budget process. The primary benefit of this integration is the creation of a five-level "ladder of accountability" (policy, program, performance, process, and probity). DuPont-Morales and Harris (1994) use the example of criminal corrections policy as an arena in which performance measurement can lead to more definitive links between activities and outcomes. In addition to strengthening accountability, they assert that attention to performance measurement will lead to better policy because the impact of agency activities on social outcomes will be better understood.

Bouckaert (1993a,b) also advocates better integration of performance measurement and budgeting. Bouckaert calls for more attention to the performance of individual managers and the impact of their performance on the organization. Gianakis (1996) makes a strong argument for performance measurement as a means to enhance management capacity. Gianakis cites several reasons for integrating performance measurement and the budgeting process:

A performance measurement system tied to the resource allocation process can help enhance communication in the policy making process. The effects of

line item changes can be identified for legislators. Citizen surveys can enhance communication and participation and, hence, the political rationality of the resource allocation process. However, the most significant impact of a program measurement system integrated with the resource allocation process of a public organization may be on the internal management processes of the organization. Technical and allocative efficiencies, as well as political responsiveness in the resource allocation process, are likely to be enhanced when organizational decision makers employ a common perspective. Performance measurement systems hold promise as communications tools in the organization development effort necessary to increase the managerial capacity of the organization. They can also function as the organizational glue in the new organizational forms that will rely less on hierarchical authority systems. (p. 142)

In the 1990s, two developments have catalyzed performance measurement, one at the federal level and one at the state and local level. At the federal level, President Clinton signed Public Law 103-62, the Government Performance and Results Act (GPRA), on August 3, 1993 (Epstein, 1996, p. 51; Halachmi, 1996, p. 78). The GPRA requires that federal agencies submit five year strategic plans to Congress by 1997. The strategic plans must include annual performance plans, which in turn contain measurable goals, objectives, and performance targets. Agencies must update their strategic plans every three years and performance plans must be revised annually. By March 31, 2000, agencies must compare actual performance against plans (Epstein, 1996, pp. 52-53).

The Governmental Accounting Standards Board (GASB) has undertaken similar efforts for state and local governments. While GASB does not have the legal authority

that Congress enjoys for mandating certain practices, it does possess considerable influence by virtue of its recognition as a standard setting body by the American Institute of Certified Public Accountants (Epstein, 1996).

GASB initiated a research project in the mid-1980s on service efforts and accomplishments (SEA) reporting. From 1989 to 1993, GASB published several SEA reports on various state and local government services, including education, transit, and health (the SEA report on fire department programs will be discussed more fully in the literature review). In 1994, GASB published *Concepts Statement No. 2 of the Governmental Accounting Standards Board on Concepts Related to Service Efforts and Accomplishments Reporting*. *Concepts Statement No. 2* states that governments should “(1) Establish and communicate clear goals and objectives; (2) set measurable targets for accomplishments; and (3) develop and measure its programs in achieving those goals and objectives.” (Rutgers University, 1999a, p. 1)

While both the GPRA and the GASB have generated a large response on the possibilities and problems of performance measurement (see Greiner, 1996; Epstein, 1996; and Halachmi, 1996 for an extended discussion of this issue), the effects on state and local governments have been clear. Several jurisdictions have made huge strides in performance measurement. Texas requires each state agency to submit strategic plans which include goals and objectives, as well as output and outcome measures. Oregon has adopted a strategic plan for economic diversification which includes 272 measures of community vitality. Minnesota uses 79 measures to assess its performance. Virginia integrates its goal setting into a performance budget process. There are 24 programs in 21 agencies which report performance measures. In 1994, Florida passed the

Government Performance and Accountability Act, which included a seven year plan to implement a budget based on performance measures. (Broom and McGuire, 1995)

Local governments have also embraced performance measurement. Routh (1994) reports that St. Pete Beach, Florida has instituted a budget system based on the fulfillment of meaningful goals, objectives, and measures. Ikerd's (1994) review of changes in Catawba County's (Florida) budget system highlights a shift from inputs to outputs, the introduction of time standards, and measurements based on quality. Results include enhanced revenues and substantial cost savings.

Salt Lake City has been very progressive in pursuing performance measurement as part of an ongoing effort to improve city services. In 1991, Deedee Corradini was elected the city's first woman mayor. Upon taking office in January 1992, she immediately launched a number of initiatives to reduce costs and improve service quality. The number of city departments was reduced from ten to eight. Layers of management were abolished. Mayor Corradini started a major total quality program in 1993 with the training of several city employees as group facilitators for teams working on customer service problems. These teams examined such diverse areas as licensing and inspection activities, billing and purchasing practices, police department career ladders, and employee safety programs.

Mayor Corradini also began a comprehensive strategic planning process involving citizens from diverse backgrounds. The steering group for this effort met for several months and produced a draft document outlining goals and objectives for a set of "key values" that included economic vitality, heritage, and responsive government. The

draft document was made available for extensive public review and comment before it was finalized.

The SLCFD was an active participant in these initiatives. In 1992, the department eliminated the rank of lieutenant to reduce the number of management layers. Several SLCFD employees were trained as team facilitators for problem solving groups. The department established several internal teams to address such issues as uniforms, apparatus relocation, ambulance transport, and organizational communications. In November 1995, the SLCFD started a strategic planning process of its own with a meeting of all of the department's supervisory personnel. Those supervisors had been previously instructed to meet with their work groups to craft a vision of the department's future. After several months of review and revision, the SLCFD adopted the plan, which contained initiatives in technology, emergency medical service delivery systems, and employee safety and wellness.

The SLCFD has also made significant strides in its internal performance measurement system. In July 1997, the department's communications center was separated from the consolidated police/fire dispatch unit that had been established in the early 1990s. In November 1997, the National Academy of Emergency Medical Dispatch recognized the newly created center as the fifteenth "center of excellence" in the world. The center achieved this distinct honor by demonstrating and documenting high levels of compliance with established protocols.

The department's emergency medical services division has developed a comprehensive quality assurance program for field operations. The core of this program consists of monthly reviews of medical incident reports to determine compliance with

established standards for documentation, assessment, and treatment. Individual evaluations may result in letters of commendation or corrective action for the paramedics and emergency medical technicians involved.

The next major step in the development of performance measures occurred in late 1997, when Mayor Corradini mandated that department heads develop performance measures in four broad areas: Financial health, effectiveness and efficiency, customer service, and workforce quality. The final set of performance measures reflected the input and expectations of elected officials and also included a number of indicators that were internally generated. Performance measures are collected monthly and reported to the mayor's office and the city council. Departments provide a narrative report each quarter to supplement the quantitative information. In addition to the performance measures, the report also contains a summary of progress on the council's legislative intents for the department. This format is intended to promote communications between department heads and elected officials.

The SLCFD currently reports on 13 performance measures, also called "service level indicators." Table 1 displays these measures and the current performance targets.

While these performance measures represented a step in the right direction, there has also been a substantial amount of criticism. The financial health measures do not account for the fact that many of the department's expenditures have an irregular pattern. For example, charges for internal service funds (fleet management and information management services contracts) are made on the first day of the fiscal year. Performance reports for the first several months reflect a deficit. Similar variations in the revenue stream can produce overly optimistic or pessimistic projections of income.

Table 1		
SLCFD Performance Measures		
Financial Health		
Operating revenues as % of budget		$\geq 100\%$
Operating expenses as % of budget		$\leq 100\%$
Two year budget outlook completed		Completed
Customer Service		
Service recipient performance rating: % satisfied		$\geq 80\%$
Survey results: % awareness of services provided		$\geq 60\%$
Efficiency and Effectiveness		
% compliance with National academy of Emergency Medical Dispatch protocols		$\geq 95\%$
Average time from dispatch to arrival on life-threatening calls		< 5.0 minutes
Percent of fire companies with minimum staffing (four fire fighters per unit)		$\geq 90\%$
Fire prevention bureau inspections		$\geq 7,500$
Fire station inspections		$\geq 1,500$
Community relations emergency preparedness training sessions and participants		$\geq 300/11,000$
Fire station emergency preparedness training sessions and participants		$\geq 350/9,000$
Workforce Quality		
Survey rating of employee job satisfaction		≥ 4.0 on a 5.0 scale

Source: *Salt Lake City Operating and Capital Budget for Fiscal Year 1999-2000*, p. F2-F3

The response time measure has been criticized because it only measures the time from dispatch to unit arrival and neglects the time spent processing the call in the communications center. At times, legislative actions positively prohibit the SLCFD from achieving its performance targets. In June 1999, the city council made a policy decision to shift money from operating expenses to capital improvement needs. The resulting budget cuts forced the department to leave several fire fighter positions vacant. Without an overtime budget to cover vacation and other leave times, the department is forced to

operate several companies below the recommended staffing level of four persons per unit. This issue has been a source of considerable tension with the fire fighters' labor unit. The city council's decision to cut a fire inspector position also hampers the fire prevention bureau's ability to meet its inspection target.

The author currently serves as the city's fire marshal and has responsibility for the four measures relating to inspections and emergency preparedness activities. One of the most frequent complaints that the author hears is that this is a "quota system" which stresses quantity at the neglect of quality. Both fire prevention bureau inspectors and operations personnel see the indicators as a matter of "getting the numbers up." This system has created some perverse incentives. Inspectors and company officers who focus on larger and more complex occupancies (where inspection is more likely to be of value) may be penalized, while inspectors who focus on smaller occupancies appear to be more productive. Instead of spending time with business owners and educating them on fire and life safety practices, inspectors are encouraged to move quickly to the next inspection.

One of the strongest criticisms of the current system is that the performance measures do not address the core of the department's mission: The prevention of injuries, deaths, and property losses from fire. Another major drawback of the current system is its failure to provide a basis of comparison with other fire departments. The fire prevention bureau may complete its target of 7,500 inspections, but there is no reference point to determine if that is exemplary or sub-standard performance. Given the level of concern over staffing levels, that measure is appropriate, but there is no measure of what the staffing level is attempting to achieve: Effective operations and fire fighter safety.

In the two years since the system was adopted, there is little to convince the author that it is achieving the benefits intended. There does not seem to be a strong correlation with accountability or resource decisions. These concerns lead the author to undertake an extensive literature review and to develop measures that would permit comparisons with other fire departments.

This applied research project relates directly to the module on quality service in the Executive Development course.

LITERATURE REVIEW

A literature review was performed to identify previous research on the subject of performance measurement. The review was initiated in August 1999 at the Learning Resource Center at the National Fire Academy while the author was attending the Executive Development course. Most of the research was undertaken using the facilities of the Marriott Library at the University of Utah in Salt Lake City. The author also used his personal library and fire department resources.

Three distinct types of literature were encountered in this review. The first type deals with the characteristics of effective performance measurement systems, including categories of measures. The second type provides detailed recommendations on how to develop a performance measurement system. The third type addresses performance measures relating specifically to fire departments. All three types contributed substantially to answering the first two research questions, assessing the SLCFD's current performance measurement system and developing new performance indicators.

Qualities and Types of Performance Measures

Greiner (1996, p. 12) lists five types of performance measures, including inputs (dollars, staff, and materials); workload or activity levels; outputs, or final products; outcomes of products and services; and efficiency (cost per unit of output or output per unit of cost). Hatry (1980) uses cost, workload-accomplished, effectiveness and quality, efficiency and productivity, unit cost, resource utilization measures, productivity indices, and cost-benefit ratios. Ammons (1995) cites four types of performance measures, including workload, efficiency, effectiveness, and productivity. Hatry, Gerhart, and Marshall (1994) describe the performance measurement system used by Prince William County, Virginia. Their five categories of measures include inputs, efficiency, outputs, service quality, and outcomes.

Berman (1998) uses seven types of measures, including effectiveness (short, mid and long range outcomes), efficiency, equity (race, geographic, sex, and income), workload, cost-benefit ratios, and benchmarks (workload standards and effectiveness standards). Portland Oregon's (1998) system employs only three major categories: Spending and staffing, workload, and results. Hatry, Blair, Fisk, Greiner, Hall, and Schaenman (1992) use five types of measures, including (1) output-input ratio measures using workload data as the unit of output; (2) output-input ratios using effectiveness as the unit of output; (3) equipment and personnel utilization rates; (4) combinations of the preceding types of measures; and (5) relative change, captured in "productivity indices." The Center for Performance Measurement (1998) suggests four types of measures, including output, efficiency, service, and outcome. Service measures consist of timeliness, courtesy, employee knowledge and the quantity of the service.

Oaks and Newland (1988, p. 255) focus primarily on efficiency and effectiveness measures consisting of ratios of output to input. They suggest that such efficiency comparisons be made over time, among internal organizational units, with external organizations, and with a standard. Swiss (1992) distinguishes between process measures (which are synonymous with workload), immediate outputs, intermediate outputs and ultimate outputs.

Ammons (1996b, p. 11-12) uses four types of measures, including workload, efficiency (relating the work performed to the resources required to perform it), effectiveness (the degree to which performance objectives are achieved), and productivity (the combination of efficiency and effectiveness in a single indicator). GASB (Rutgers University, 1999b) employs a three tier system for categorizing measures. The first category consists of indicators of service efforts and includes inputs. Inputs are the dollar cost of the service in constant or current dollars and may be expressed as a per capita or per household figure. Inputs also include nonmonetary resources, such as the amount of labor time. The second category is comprised of indicators of service accomplishments. The two major types of indicators in this category are outputs, which reflect the amount of workload accomplished, and outcomes, which are indicators of program results. The third category of indicators relate service efforts to service accomplishments and includes input/output ratios, input/outcome ratios, and productivity indices which relate the current year to a base year.

Another version of GASB's categories (Rutgers University, 1999c) expands the definition of an outcome measure to include the quantity of a service provided that meets a certain quality requirement. It also introduces the concept of "secondary effects" in the

discussion of output measures. Secondary effects are not the principal objectives of providing a service, but reflect other benefits, such as a reduction in traffic accidents from an increase in the use of public transportation.

Several authors also address the issues of the desirable qualities of performance measures. Their recommendations are summarized in Table 2.

Table 2		
Qualities of Effective Performance Measures		
<u>Hatry (1980)</u>	<u>Hatry, et. al. (1992)</u>	<u>Swiss (1992)</u>
Validity/accuracy	Appropriateness and validity	Reliability
Understandability	Uniqueness	Validity
Timeliness	Completeness	
Potential for encouraging perverse behavior	Comprehensibility	<u>Bouckaert (1993)</u>
Uniqueness	Controllability	Validity
Data collection costs	Cost	Legitimacy
Controllability	Timeliness of feedback	Functionality
Comprehensiveness	Accuracy and reliability	
<u>Center for Performance Measurement (1998)</u>		<u>Ammons (1996)</u>
Results oriented	Accessible	Valid
Relevant	Comparable	Reliable
Responsive	Compatible	Understandable
Valid	Clear	Timely
Reliable	Useful	Resistant to perverse behavior
Affordable		Sensitive to data collection costs
Cost effective		Focused on control- lable aspects of performance
		Comprehensive
		Non-redundant

Performance Measure Development Processes

A substantial body of literature addresses the process of developing performance measures. Grizzle (1982) presents several considerations, including the need to include “uncontrollable” outcome data, the needs of various data users, the stage of program development, the question of who sets goals, and the concept of joint responsibility with other agencies in assessing outcomes. Ammons (1995) urges the use of “higher level indicators” that move beyond workload measures to include efficiency, effectiveness, and productivity data.

Hatry, Gerhart, and Marshall (1994) present 11 recommendations for making performance measurement more useful for managers. Their recommendations include addressing service quality and outcomes, asking program managers to set performance targets, supplementing quantitative information with explanatory text, incorporating outcome measures into external contracts, and providing timely feedback to supervisors and managers. Hatry, et. al. (1992) recommend using operating agencies in the development, implementation, and use of measures; using effectiveness measures in a positive and constructive way; providing incentives for participation and staff support for assistance; institutionalizing measurement activities; and providing strong organizational support and regular and timely feedback.

Griffel (1994) presents a framework to assess the readiness of an organization to undertake performance measurement. The components of this assessment include risk taking, resource commitment, training, trust, and employee support. Griffel also recommends starting with a few key measures, periodically auditing the data, including explanatory information, not using too few or too many measures, and using data at the operating manager level.

The Center for Performance Measurement (1998) places the development of performance measures in the context of strategic planning. Strategic planning produces a mission statement. The mission statement leads to goals. Goals lead to objectives. Performance measures reflect the achievement of the objectives. The primary advantage of this approach is the alignment of the mission, goals, objectives, and performance measures.

Swiss (1992) distinguishes between management by objectives (MBO) systems and performance monitoring systems. MBO systems focus on individual managers and units and are often tailored to specific projects. By contrast, performance monitoring applies to all or most of the agency and deals with continuing operations. Swiss recommends using multiple indicators and developing “chains of output.” Chains of output begin with the organizational processes usually described by conventional workload measures. While processes are easy to measure, they are also the least informative in assessing whether an agency is accomplishing its mission. Moving to the right along the chain leads to immediate outputs, intermediate outputs, and ultimate outputs. The influence of factors other than agency programs becomes greater as one moves toward ultimate outputs.

Swiss recommends selecting indicators on the basis of how well they inform decision making or affect behavior. Swiss also describes four methods for setting performance objectives, including negotiation, using past practice, imposing quotas, and relying upon engineered standards. Negotiation is the preferred method. Swiss also devotes considerable attention to the phenomenon of goal displacement. Swiss uses the

measure of “number of tickets written” by state troopers to illustrate how indicators can potentially distract employees from the organization’s legitimate goals.

Ammons (1996b, p. 20) outlines 13 steps in the development and administration of a performance measurement system. Key steps include securing management commitment, identifying goals and objectives, focusing on service quality and outcomes, assigning responsibility for data collection and reporting, establishing a basis for comparison, and publicly reporting certain measures.

There is also a large body of literature addressing potential problems in performance measurement. Halachmi (1996) warns about the potential for manipulation of members, the difficulty of linking programs to results, and the existence of multiple influences on performance indicators. Greiner (1996, p. 16) cites institutional, pragmatic, technical, and financial obstacles to developing measures. Ammons (1996a) cautions against letting professional associations set standards for local governments. Ammons asserts that such standards can be self-serving and recommends that measures address performance directly.

Swiss (1992) advocates a focus on outcomes rather than processes. Ammons (1996b) sharply criticizes the practice of focusing solely on workload measures:

In essence, workload measures are a form of “bean counting.” Such a count is important. To anyone wanting to get ahead in the bean business, however, it is also important to know the quality of the beans and the efficiency with which they are grown and harvested. (p. 92)

Ammons’ critique also extends to the concept of unit cost, a traditional measure of efficiency. Ammons argument against using unit costs is compelling.

Unit costs have been omitted because of their extreme vulnerability to inflation (e.g., during periods of high inflation unit costs may become quickly outdated unless “constant dollar” calculations are made), economic differentials (e.g., regional variations in the cost of labor could produce erroneous judgments on the relative efficiency of labor-intensive operations), and accounting vagaries (e.g., inconsistent accounting practices across jurisdictions for overhead, employee benefits, capital acquisition and depreciation, to name a few, could distort comparisons). (p. 5)

Fire Department Performance Measures

The final section of this literature review deals directly with the object of this research project: Fire department performance measures. Several authors have proposed some fairly elaborate and complex measurement systems for municipal fire departments. Due to the length of several of these sets of proposed performance measures, they are presented in their entirety in Appendix A.

Ammons (1984) suggests the most simple measure for assessing the quality of fire department services: Insurance Services Office (ISO) ratings. Ammons uses an ISO rating of 1, 2, 3, or 4 as evidence of superior quality in fire protection services in a study of 14 “high service quality” cities.

An early work by Schaenman and Schwartz (1974) develops a much more complex system of measurements for “assessing fire protection effectiveness and productivity” (p. 15). Their proposal includes 14 “output indicators” for fire prevention effectiveness, fire suppression effectiveness, overall fire protection effectiveness, and workload handled. Three “input measures” focus on expenditures and personnel. There

are nine measures of “conditioning factors” relating to community characteristics. Six measures are used to describe the characteristics of the fire department and the water supply.

Hatry, et. al. (1992) present 23 measures in five categories: (1) Overall loss minimization; (2) prevention effectiveness; (3) suppression effectiveness; (4) number of false alarms; and (5) general citizen satisfaction. The International City/County Management Association (1999) uses 30 measures in the four categories of service area descriptors, service provider descriptors, fire suppression, and community risk reduction. Ammons (1996b) presents several sets of indicators for inspection services, emergency communications, emergency medical services, and fire services. This work is unique in its reporting of a number of measures for several different cities. This is only one of two citations in the literature on fire department performance measurement where actual comparative data is displayed. The other source of actual data is Portland, Oregon (1998) which reports 18 measures of service efforts and accomplishments. Input measures are titled “Spending and Staffing,” output measures are referred to as “Workload,” and outcome measures are called “Results.” The Portland report contains data for six comparison cities.

Hatry, Fountain, Sullivan, and Kremer (1991) present 20 measures as part of a set of recommended indicators for service efforts and accomplishments reporting for fire departments. They categorize measurements as inputs, outputs, and outcomes. In a separate section, these authors recommend 16 indicators for fire prevention programs.

PROCEDURES

This research project used an evaluation methodology to answer the three research questions. The specific procedures used included a literature review, a compilation of suggested performance measures for fire departments, the development of a proposed new performance measurement system, the use of secondary survey results, and the use of actual comparative performance measures.

Literature Review

A literature review was begun at the Learning Resource Center of the National Fire Academy during the author's attendance there in July and August of 1999. Most of the literature review was completed at the Marriott Library at the University of Utah in the fall of 1999. The primary materials consisted of public administration books and journals. The author's personal library provided materials specific to the SLCFD and the Salt Lake City budget. The Internet was used for information about the GASB and ICMA, as well as budget data for Portland.

Compilation of Suggested Performance Measures

The literature review produced a rich assortment of information to answer the first two research questions. Dozens of performance indicators were derived from that review and are reproduced in Appendix A. The literature also contained an excellent overview of the characteristics of a good performance measurement system.

Research question #1 inquired about the set of performance measures currently used by the SLCFD. This research question was answered by comparing the SLCFD's current performance measures with the list of recommended measures. Measures that were replicated in the literature review, especially in more recent works, were retained.

Measures that seemed more unique to the SLCFD were subject to further evaluation to determine whether they served a useful purpose.

The literature review also proved extremely helpful in answering research question #2 on measures which might be used by the SLCFD. The author reviewed these measures and the data available from the existing survey described below to generate a new set of performance measures.

Use of Existing Survey Data

The Phoenix (Arizona) Fire Department conducts a survey of US and Canadian fire departments every two years. The author of the survey is Mr. Kevin Roche, a fire protection engineer in the department, who has graciously allowed the author of this research project access to a significant portion of the survey results. Mr. Roche sent the author information from 130 fire departments with a resident population between 100,000 and 250,000. The information included population, area, normal and minimum staffing figures, numbers and types of major apparatus, number of stations, and fire death, injury, and dollar loss statistics.

Developing Performance Measures

The list of performance measures from the literature review and the data available from the Phoenix survey permitted the development of several performance indicators which could be used for comparison with other cities.

One of the problems encountered with the survey data concerned population estimates. The data from the 1990 census is now obsolete and the results of the 2000 census will not be available for more than a year after the completion of this research project. Since many of the measures are based on population, it was essential that these

numbers be as accurate as possible. The author used population estimates from the US Census Bureau to standardize this estimate. The Census Bureau estimates made for July 1, 1998 coincided with the date of much of the survey data. The census bureau information is available on the world-wide web and can be accessed at www.census.gov. The author used the population estimates to identify cities with a population between 150,000 and 200,000. This range was chosen because Salt Lake City, with a resident population of 174,348, lies almost exactly in the middle of this range.

The list of cities from the Census Bureau data was compared with the list of respondents to the Phoenix survey. A total of 32 cities were found in the population range that had provided responses to the survey. Data from the survey for these cities was entered into a spreadsheet and the performance measures were calculated from this data. The entire spreadsheet is reproduced as Appendix B.

Comparing Performance Measures

The final step in the procedures involved the comparison of performance indicators for the 32 survey cities and Salt Lake City. This was accomplished by using the data from the spreadsheet in Appendix B and calculating an average for the 32 cities. Salt Lake City's results were compared with the average both with actual numbers and with the use of an index number. The index number was obtained by dividing Salt Lake City's results by the average and then multiplying the resulting number by 100. Thus an index number of 150 would indicate that the SLCFD's result was 50% higher than the average.

Assumptions and Limitations

There were several assumptions and limitations that influenced this research project. The most critical assumption involved the accuracy of the data. The acceptance of the results of this survey implies an assumption that the data in the spreadsheets is completely accurate. Violation of this assumption negates the validity of the results.

There were several limitations on this project. The most significant limitation involved the time limit imposed for its completion. The six month time frame permitted a fairly comprehensive review of the literature. However, there was little time to devote to assuring that the data used were accurate. Additional time would have permitted more checking to assure that the data were correct. This was particularly true for those departments that provide services outside of their city limits. The population estimates would have failed to account for the additional population and would have biased the results against these departments.

The second major limitation was the size of the sample of comparison cities. A sample of 32 only begins to achieve statistical significance. A larger sample would have allowed more confidence in the results.

The third major limitation involved differences in the comparison cities that were not captured by the data collected. The comparison cities were chosen solely on the basis of population estimates. Cities differ greatly on a number of dimensions, including poverty rate, age of structures, and age distribution. All of these factors influence the demand for fire protection and emergency services. For example, a city with newer structures protected by automatic fire suppression systems might need fewer fire protection resources than cities with older structures. This limitation underscores the

point that users of performance information should look beyond the quantitative information for the reasons underlying differences in cities.

The fourth major limitation concerns the use of fire loss data. Deaths, injuries, and property losses can vary widely in a jurisdiction from year to year. To some degree, this is offset by using several cities to achieve an average. The use of a single year's data may lead to erroneous conclusions and definitive judgments about a particular city should not be made based solely on this data. A better method would use averages of data over three years. Time limits prevented expanding the data set to make this modification.

The fifth major limitation concerns the scope of services provided by the departments. Modern fire departments are called upon to provide a variety of services in addition to their traditional roles in emergency response. This study examined only a narrow range of services.

Definition of Terms

GASB. Governmental Accounting Standards Board. The body that establishes generally accepted accounting principles for state and local governments.

Outcome. The ultimate effect of an activity. In the fire service, outcomes may include reduced fire deaths, injuries and property losses.

Output. The product of an organization's activities. In the fire service, outputs may include fires extinguished, inspections made, patients treated, and arson suspects arrested.

SEA. Service efforts and accomplishments. This term refers to an initiative by the Governmental Accounting Standards Board to have government activities measure activities and accomplishments.

RESULTS

Research Question #1: How useful are the SLCFD's current set of performance measures for comparison purposes?

Of the 13 measures used by the SLCFD, only six were found in the list of recommended performance measures. These included the number of fire prevention inspections and inspections conducted by fire station personnel (Schaenman, 1974; Hatry, Fountain, Sullivan, and Kremer, 1991), response times (Schaenman and Schwartz, 1974; City of Portland, 199; Ammons, 1996b), staffing on individual fire apparatus (Ammons, 1996b), percentage of citizens rating the fire service as satisfactory (Hatry, Fountain, Sullivan, and Kremer, 1991), and the number of educational programs (Hatry, Fountain, Sullivan, and Kremer, 1991).

It is very likely that these six measures would be useful for comparison purposes. This does not imply that the other seven measures should be summarily discontinued. They serve useful internal management needs. However, they are less likely to provide a basis for comparison with other cities.

Research Question #2: What performance measures could be used to compare the SLCFD to other fire departments?

The literature review presented several dozen indicators to use in designing a performance measurement system. A consistent theme throughout the literature concerned the need to report outcome and effectiveness data using fire deaths, injuries, and dollar losses. Six outcome and effectiveness measures were developed from the data available from the Phoenix survey:

Total alarms per thousand population

Structure fires per thousand population

EMS calls per thousand population

Civilian deaths per 100,000 population

Civilian injuries per 100,000 population

Property loss in dollars per capita

Another common performance category is efficiency, or the ratio of outputs to inputs. Because there were strong warnings in the literature against using dollar figures, efficiency measures were created by using a ratio of output (resident population protected and land area protected) to input (total uniformed personnel, normal on-duty staff, minimum on-duty staff, number of stations and the total number of engine, truck, and quint companies). This approach was consistent with the recommendations of Hatry, Fountain, Sullivan, and Kremer (1991), Ammons (1996b), and the City of Portland (1998). Ten measures resulted from this process:

Population per uniformed fire fighter

Population per normal on-duty staff

Population per minimum on-duty staff

Population per station

Population per major apparatus (engines, trucks, and quints)

Land area per 100 uniformed fire fighters

Land area per 100 normal on-duty staff

Land area per 100 minimum on-duty staff

Land area per station

Land area per major apparatus

Multiple measures were used to offset biases introduced by differences in workweeks and the distribution of resources. Departments with shorter workweeks must have more staffing to maintain equal service levels when compared to cities with longer workweeks. A focus solely on the total number of uniformed personnel would overstate the resource level for departments with shorter workweeks and understate the level for departments with longer workweeks. Similarly, measures for departments with relatively more stations and lower staffing (or vice versa) would be distorted if multiple measures were not employed.

A major problem with indicators based solely on population and land area is the distortion that results from not including commuting workers, shoppers, tourists, and other visitors. Cities are not only places where people live. They are also centers of economic activity. This problem is acutely felt in Salt Lake City, where the daily influx of commuters more than doubles the residential population (Salt Lake City, 1999). Ratios that rely solely on resident population will significantly understate the level of coverage.

In an effort to resolve this problem, the author collected economic data from the 1990 census and calculated ratios of coverage using fire department resources. This was done to illustrate a possible methodology for capturing indicators of economic activity. Unfortunately, the data on economic activity was more than 10 years older than the survey data and there is no possibility that the resulting ratios could be considered valid or reliable. However, the author believes that this is a sound methodology and proceeded to calculate the indicators as an exercise. While the results are not presented as part of this research project's findings, this procedure should be replicated when more current

data becomes available. Appendix C contains a full description of the proposed economic indicators and illustrative results.

The third category of performance measures involves workload. Workload measures are used by the City of Portland (1998). Workload measures were derived by dividing the different types of workload (total alarms, structure fires, and EMS calls) by the resources available (total number of uniformed personnel, normal on-duty staff, minimum on-duty staff, number of stations, number of major apparatus). Fifteen measures were created:

Total alarms per total uniformed personnel

Total alarms per normal on-duty staff

Total alarms per minimum on-duty staff

Total alarms per station

Total alarms per major apparatus (engines, trucks, and quints)

Structure fires per total uniformed personnel

Structure fires per normal on-duty staff

Structure fires per minimum on-duty staff

Structure fires per station

Structure fires per major apparatus

EMS calls per total uniformed personnel

EMS calls per normal on-duty staff

EMS calls per minimum on-duty staff

EMS calls per station

EMS calls per major apparatus

Multiple indicators are again used for two reasons. First, they help to overcome biases introduced by variations in resource levels, as discussed previously. Second, this disaggregation of the types of responses provides more data on the character of the workload generated for the department. The workload measures still contain some bias. Departments with relatively larger numbers of single company responses will have an inflated figure for workload when compared to departments with larger numbers of multiple company responses. Further study is needed to develop a weighting scheme to reduce this bias.

Research Question #3: How does the SLCFD compare to other fire departments on these performance measures?

The results of the spreadsheet calculations for each of the proposed measures are presented in Table 2. The full spreadsheet is included in this report as Appendix B. The average for the 32 cities is compared with the SLCFD's result. The ratio of the SLCFD's result to the average produces an index number that allows for immediate comparison on a percentage basis.

DISCUSSION

The results of this study suggest several actions for the SLCFD's performance measurement system. It is apparent that the current system lacks outcome and effectiveness measures. Data on fire deaths, injuries, and losses should be included in performance reports and compared with other jurisdictions. This issue will be discussed further in the section on recommendations.

Table 3

Performance Measures Results

Outcome and Effectiveness	<u>Average</u>	<u>SLCFD</u>	<u>Index</u>
Total alarms per thousand population	89	139	157
Structure fires per thousand population	2.2	1.5	67
EMS calls per thousand population	53	100	187
Civilian deaths per 100,000 population	1.06	0	0
Civilian injuries per 100,000 population	12	14	117
Loss per capita	25.87	23.47	91
Efficiency and Coverage			
Population per total uniformed personnel	855	547	64
Population per normal on-duty staff	3,166	2,356	74
Population per minimum on-duty staff	3,358	2,724	81
Population per station	17,042	13,411	79
Population per major apparatus	12,175	11,623	95
Area per 100 total uniformed personnel	31	34	110
Area per 100 normal on-duty staff	115	149	130
Area per 100 minimum on-duty staff	124	172	139
Area per station	6.4	8.5	133
Area per major apparatus	5.1	7.3	143
Workload			
Total alarms per total uniformed personnel	70	76	109
Total alarms per normal on-duty staff	255	328	129
Total alarms per minimum on-duty staff	272	379	139
Total alarms per station	1,459	1,865	128
Total alarms per major apparatus	1,077	1,616	150
Structure fires per total uniformed personnel	1.63	0.81	50
Structure fires per normal on-duty staff	6.48	3.49	54
Structure fires per minimum on-duty staff	6.87	4.03	59
Structure fires per station	35	20	57
Structure fires per major apparatus	28	17	61
EMS calls per total uniformed personnel	43	55	128
EMS calls per normal on-duty staff	157	235	150
EMS calls per minimum on-duty staff	165	272	165
EMS calls per station	893	1,338	150
EMS calls per major apparatus	678	1,159	171

The SLCFD's current system relies heavily on activity indicators. Four of the indicators (fire prevention bureau inspections, fire station inspections, community relations preparedness sessions and participants, and fire station preparedness sessions

and participants) refer entirely to internal processes. The performance measurement system does not include outcome data for these activities. Of the remaining measures, six are supported by the literature review. Ratings of customer satisfaction, response time averages, and apparatus staffing levels provide a basis for comparison with other cities. It would be useful to modify the response time measure to include call processing time prior to dispatch, because this is the “waiting time” that the service recipient experiences. The measure of job satisfaction is unique, but fits well with the emphasis on outcome data and should be retained. The measure of dispatch protocol compliance is also not found in the literature, but it is a very useful output measure. While this measure serves primarily internal purposes, an argument could be made for its inclusion in the public report given the SLCFD’s distinguished history as a leader in emergency medical dispatch.

The measures of financial health are also not supported by fire service related measures, but they likely serve useful internal management purposes. This is especially true when the measures are compared with data from prior years. It is debatable whether this data should be reported externally, since seasonal variations could produce either positive or negative trends that do not validly reflect financial management capability.

The results from the comparison of Salt Lake City’s indicators with the average from the 32 comparison cities provide several insights. The outcome and effectiveness data present a picture of a department that is very successful at its fire prevention efforts. Structure fires per thousand population are 33% below the average and the fire loss figure is 9% below the average. Injuries are 25% above the average, but the numbers involved

are relatively small. The fact that there were no fire deaths in 1997 literally leaves no room for improvement.

The study produces conflicting results when comparing coverage and efficiency indicators to measures of workload. A focus solely on efficiency measures using only residential population would (and has) lead to the conclusion that the SLCFD has too many resources. The five indicators based on population suggest that the SLCFD's resources are covering 36% to 5% fewer people than the comparison cities. If an analyst were to rely solely on these figures to make recommendations on resource levels, the total number of uniformed staff would drop from 319 to 204, the normal on-duty staff would drop from 74 to 55, there would be 10 stations instead of 13, and the department would eliminate one of its 15 engine and truck companies.

A very different conclusion results when land areas are used as the basis for computing average ratios. Measures using land area indicate that the SLCFD's resources are covering from 10% to 43% more land area than comparable cities. An analysis based solely on land area would support an increase from 319 to 350 total uniformed personnel, from 74 to 96 on-duty personnel, from 13 to 17 fire stations, and from 15 to 21 engine and truck companies. These results underscore the need to use multiple measures.

The workload indicators also present some diverse results. On the whole, the SLCFD's resources are from 9% to 50% busier than comparison cities. However, workload figures based on structure fires show that the SLCFD is from 39% to 46% less busy. This finding is consistent with the lower rate for structure fires identified by the outcome and effectiveness indicators. Interestingly, workload figures based on EMS

calls show that the SLCFD's resources are from 28% to 71% busier than the resources in comparison cities.

These results produce conflicting conclusions about the SLCFD. A researcher trying to discover the optimum level of resources for the SLCFD would find very different results depending on whether population, land area, or workload is used as a basis for comparison.

Perhaps the most useful conclusion to be drawn from these results concerns the type of demand experienced by the SLCFD. While the department responds to fewer structure fires than the average, it has an extraordinarily high number of EMS responses.

It is clear that this research project has raised more questions than it has answered. The workload and coverage measures have produced conflicting answers on whether the resource level in Salt Lake City is too high or too low. Past studies of the SLCFD using only residential population coverage measures have advocated cuts in staffing to bring the department more in line with comparison cities. None of these past studies examined the city's economic infrastructure or considered the fire protection and emergency service needs of the non-residential sector.

The conflicting information produced by this study invites further research. One of the tools available to fire departments involves the development of a "standard of coverage." The Commission on Fire Accreditation International (1997) discusses standards of coverage in some depth. The first step in the standard consists of identifying distinct geographic areas within a jurisdiction. Targets are established for the level of resources needed for different types of emergencies within each area. Response time goals are also established. The jurisdiction then measures its current performance against

these targets and recommends remedial action, if necessary. The city of Colorado Springs (Colorado) (City of Colorado Springs, 1999) recently completed an extensive analysis of their standards of coverage.

RECOMMENDATIONS

The results of this study suggest several recommendations for the SLCFD.

Recommendation #1: The SLCFD should review its current performance measurement system and establish new indicators for outcomes and effectiveness.

It is apparent from a review of the general literature on performance measurement and lists of specific measures for fire departments that the SLCFD should revisit its process for developing measures. Several authors suggest that this should occur in the context of developing mission statements and strategic plans. Performance measures that reflect the achievement of specific targets will better assure the alignment of mission, goals and objectives.

The new measures should include outcome indicators. This study presented several measures using fire deaths, injuries, and dollar loss. The performance measures should also include information on fire fighter safety. Data on firefighter deaths and injuries was not available for this research project, but would be an integral part of an adequate performance measurement system.

Recommendation #2: The SLCFD should establish a list of cities for the comparison of performance measures.

This study identified 32 cities based on population estimates and data availability. The results of the 2000 census and further examination of demographic data will help to determine whether or not these are optimum comparison cities. A thorough review of

demographic data should be done to establish a list of cities that are similar to Salt Lake City. A comparison of Salt Lake City with these cities will lead to more confidence in the results and more valid conclusions about the SLCFD's performance.

Recommendation #3: The SLCFD should engage in a full benchmarking effort with other fire departments.

This research project focused exclusively on quantitative measures. A true benchmarking effort would include the identification of "high performance departments." It would also include a review of "best practices" from these departments. The addition of qualitative information should provide some innovative strategies for the SLCFD to improve its service delivery system and make a positive impact on the outcome and effectiveness measures. The quantitative measures will answer the question "How are we doing?" The qualitative measures will answer the question "How can we improve?"

Recommendation #4: Comparative performance measures should be expanded to include economic data.

Most comparisons of fire departments use only residential population as a unit of measure. Urban areas present a complex mix of economic activities. Comparative data should be expanded to include information on manufacturing, retail, wholesale, service, and nonprofit activities. Such measures will provide a more accurate portrayal of the protection needs of the community.

Recommendation #5: The SLCFD should undertake a standards of coverage analysis.

A typical approach to analyzing a community's fire protection and emergency services system consists of reviewing coverage and efficiency measures or workload measures. At best, these are only surrogates for a measurement of service level. The

SLCFD should review its protection needs based on the hazards of different geographical areas of the city. Resource needs and response time targets can be compared to actual performance data to create an overview of community needs and the protection system. Decisions on the deployment of personnel and equipment should be based on this standards of coverage analysis.

Recommendation #6: The SLCFD should institute performance measurement at all levels of the department.

This research project has outlined the benefits of performance measurement in terms of improved accountability, communication, decision making, and resource allocation. Performance measurement provides an excellent management tool when it is used in conjunction with a collaborative goal and objective setting process. The goal setting process in turn should be aligned with the organization's mission and strategic plan.

Performance measurement at the division or unit level should focus on outputs and outcomes. Measures of workload or processes should be used to assess their influence on outcomes and effectiveness.

Recommendation #7: The SLCFD should actively support the development of databases with information to support comparative performance measurement.

One of the barriers to conducting comparative performance measurement is the lack of a comprehensive database on fire service organizations. The data used in this research project were produced by the extraordinary efforts of an individual in the Phoenix Fire Department. A centralized repository of information would significantly enhance the ability of individual departments to analyze their own performance.

REFERENCES

- Ammons, D. (1984). *Municipal productivity: A comparison of fourteen high-quality service cities*. New York: Praeger
- Ammons, D. (1995, January/February). Overcoming the inadequacies of performance measurement in local government: The case of libraries and leisure services. *Public Administration Review*, 37-47
- Ammons, D. (1996a). Local government standards via professional associations: How useful are they in gauging performance? In A. Halachmi & G. Bouckaert (Eds.), *Organizational performance and measurement in the public sector: Toward service effort, effort and accomplishment reporting*. (pp 201-221). Westport, CT: Quorum
- Ammons, D. (1996b). *Municipal benchmarks: Assessing local performance and establishing community standards*. Thousand Oaks, CA: Sage Publications
- Berman, E. (1998). *Productivity in public and nonprofit organizations*. Thousand Oaks, CA: Sage
- Bouckaert, G. (1993a, Fall). Measurement and meaningful management. *Public Productivity and Management Review*, 17, 31-43
- Bouckaert, G. (1993b, Fall). Performance measurement and public management. *Public Productivity and Management Review*, 17, 29-30
- Broom, C. & McGuire, L. (1995, Winter). Performance based government models: Building a track record. *Public Budgeting and Finance Journal*, 15-24
- Center for Performance Measurement. (1998). *Performance Measurement: Concepts and Techniques*. No place of publication

City of Colorado Springs. (1999, July 28). *Fire Department Response Standards*.
Unpublished memorandum from Fire Chief Manual Navarro to City Manager James H.
Mullen

City of Portland. (1998). *Service efforts and accomplishments report for FY97-98*.
Portland: Author

Commission on Fire Accreditation International. (1997). *Fire and Emergency
Service Self Assessment Manual* (3rd ed). Fairfax, Virginia: Author

Dupont-Morales, M.A. & Harris, J.E. (1994, Spring). Strengthening
accountability: Incorporating strategic planning and performance measurement into
budgeting. *Public Productivity and Management Review*, 231-239

Epstein, P. (1996). Redeeming the promise of performance measurement: Issues
and obstacles for governments in the United States. In A. Halachmi & G. Bouckaert
(Eds.), *Organizational performance and measurement in the public sector: Toward
service effort, effort and accomplishment reporting* (pp. 51-75) Westport, CT: Quorum

Fischer, R.J. (1994, September). An overview of performance measurement.
Public Management, S2-S8

Gianakis, G. (1996). Integrating performance measurement and budgeting. In A.
Halachmi & G. Bouckaert (Eds.), *Organizational performance and measurement in the
public sector: Toward service effort, effort and accomplishment reporting* (pp. 127-143)
Westport, CT: Quorum

Greiner, J. (1996). Positioning performance measurement for the twenty-first century. In A. Halachmi & G. Bouckaert (Eds.), *Organizational performance and measurement in the public sector: Toward service effort, effort and accomplishment reporting* (pp. 11-50) Westport, CT: Quorum

Grifel, S. (1994, September). Organizational culture: Its importance in performance measurement. *Public Management*, S19-S20

Grizzle, G. (1982, September). Measuring state and local government: Issues to resolve before implementing a performance measurement system. *State and Local Government Review*, 14, 132-136.

Halachmi, A. (1996). Promises and possible pitfalls on the way to SEA reporting. In A. Halachmi & G. Bouckaert (Eds.), *Organizational performance and measurement in the public sector: Toward service effort, effort and accomplishment reporting* (pp. 77-100) Westport, CT: Quorum

Halachmi, A. & Bouckaert, G. (1996). Performance appraisal and the Rubik's cube. In A. Halachmi & G. Bouckaert (Eds.), *Organizational performance and measurement in the public sector: Toward service effort, effort and accomplishment reporting* (pp. 1-9). Westport, CT: Quorum

Hatry, H. (1980, December). Performance measurement principles and techniques: An overview for local government. *Public Productivity Review*, 4, 312-339.

Hatry, H. P., Blair, L., Fisk, D.M., Greiner, J.M. Hall, J.R., & Schaenman, P. (1992). *How effective are your community services?* Washington, DC: International City/County Management Association

Hatry, H. Fountain, J., Sullivan, J., & Kremer. *Service efforts and accomplishments: Its time has come. Recommended SEA indicators for fire departments*. Retrieved December 18, 1999 from the World Wide Web:
<http://www.rutgers.edu/Accounting/raw/seagov/pmg/perfmeasures/project/report/>

Hatry, H., Gerhart, C., & Marshall, M. (1994, September). Eleven ways to make performance measurement more useful to public managers. *Public Management*, S15-S18

Ikerd, J. (1994, September). Case study: Catawba county redesigns its budget system. *Public Management*

International City/County Management Association. (1999). *ICMA comparative performance measurement program: Fire services*. Retrieved December 18, 1999 from the World Wide Web: <http://icma.org/go.cfm>

Oaks, D.W. & Newland, C. (1988). Program management. In R.J. Coleman & J.A. Granito (Eds.) *Managing Fire Services* (2nd ed.). Washington, DC: International City/County Management Association

O'Toole, D. & Stipak, B. (1996). Implementing service efforts and accomplishments reporting: The Portland experience. In A. Halachmi & G. Bouckaert (Eds.), *Organizational performance and measurement in the public sector: Toward service effort, effort and accomplishment reporting* (pp. 100-113) Westport, CT: Quorum

Poister, T. & Streib, G. (1994, Winter). Municipal management tools from 1976 to 1993: An overview and update. *Public Productivity and Management Review*, 18, 115-125.

Routh, M.G. (1994, September). Case study: St. Pete Beach and its performance measurement system. *Public Management*, S21-S22

Rutgers University, Department of Accounting. (1999a). *Concepts Statement No. 2*. Retrieved December 18, 1999 from the World Wide Web:

<http://www.rutgers.edu/Accounting/raw/seagov/pmg/perfmeasures/gasbsea.html>

Rutgers University, Department of Accounting. (1999b). *The elements of performance measurement reporting*. Retrieved December 18, 1999 from the World-Wide Web:

<http://www.rutgers.edu/Accounting/raw/seagov/pmg/perfmeasures/categori.html>

Rutgers University, Department of Accounting. (1999c). *Introduction to performance measurement*. Retrieved December 18, 1999 from the World Wide Web:

<http://www.rutgers.edu/Accounting.raw/seagov/pmg/perfmeasures/intropm.html>

Salt Lake City Corporation. (1999). *Mayor's recommended budget for fiscal year 1999-2000*. Salt Lake City, UT: Salt Lake City Corporation

Schaenman, P. & Schwartz, J. (1974). *Measuring fire protection productivity in local government*. Boston: National Fire Protection Association

Stanley, D. (1964). Excellence in public service: How do you really know? *Public Administration Review*, 24, 170-174.

Swiss, J.E. (1992). *Public management systems: Monitoring and managing government performance*. Englewood Cliffs, NJ: Prentice Hall

Timme, M. (1996). Institutionalizing SEA reporting across the budget. In A. Halachmi & G. Bouckaert (Eds.), *Organizational performance and measurement in the*

public sector: Toward service effort, effort and accomplishment reporting (pp. 115-126)

Westport, CT: Quorum

APPENDIX A: LISTS OF FIRE DEPARTMENT PERFORMANCE MEASURES

APPENDIX A

SUGGESTED FIRE DEPARTMENT PERFORMANCE MEASURES

Ammons (1996b)

Emergency Communications:

Speed

Accuracy

Good judgment

Emergency Medical Services:

Response time

Workload (responses per paramedic or crew)

Effectiveness (stabilization time, treatment time, prehospital time, resuscitation rates, complaints)

Collection rates and cost recovery

Fire Service:

Staffing level (career fire fighters per 1,000 population, individual apparatus staffing)

Fire fighter deaths and injuries

Pumpers per 1,000 people

Aerial apparatus per 1,000 people

Stations per 1,000 people

Fire insurance ratings

False alarms (percentage of all alarms, per 1,000 population)

Response time

Fire incidents per 1,000 structures

“Under control” time

Residences with smoke detectors

Built-in protection of commercial structures

Prompt response to fire safety complaints

Vehicle extrication time

Responses per company

City of Portland (1999)

Spending and Staffing

Spending per capita

On duty emergency staff per 100,000 residents

Workload

Total fire, medical, and other emergency calls

Structural fires

Incidents per on-duty emergency staff

Commercial code inspections

Code violations found

Results

Fires per 1,000 residents (structural and total)

Lives lost per 100,000 residents

Fire property loss (per capita and per cent of property value)

Percent of response times under four minutes

Percent of commercial buildings inspected

Resident rating of fire and rescue service

Percent of residents prepared to sustain self in major disaster

Percent of residents trained for medical emergency

Hatry, et. al. (1992)

Overall loss minimization

Civilian casualties (injuries and deaths per 100,000 population)

Fire fighter casualties (per 100 fire fighters and per 1,000 fires)

Property loss (per \$1,000 of property served and per 100,000 population)

Prevention

Reported fire incidence (fires per 1,000 population)

Reported building fire incidence (per 1,000 occupancies by occupancy type and fire size)

Reported plus unreported building fire incidence rate (per 1,000 households or businesses)

Preventability of fires (percentage and rate preventable by inspection or education)

Inspection effectiveness (fire rate in inspected versus uninspected properties)

Deterrence effectiveness for arson (incendiary and suspicious fires per 1,000 population)

Apprehension effectiveness for fire related crimes (clearance and conviction rates)

Juvenile fire setter recidivism (percent of juveniles sent to treatment who set fires again within two years)

Inspection outreach (percent of occupancies inspected within x months)

Inspection violation “clearances” (percentage of violations cleared within x days)

Detector and sprinkler usage and maintenance (percentage of homes or businesses with sprinklers and working smoke detectors)

Public education outreach (percent of citizens reached by public fire education)

Suppression

Fire fighting effectiveness-dollar loss (average dollar loss per fire not out on arrival)

Fire fighting effectiveness-spread (number and percentage of fires not out on arrival in which spread after arrival is limited to x square feet or z steps of the extent of flame scale)

Fire fighting effectiveness-time (time to control or extinguish fires)

Speed of providing service (percent of response times that are less-or more-than x minutes and average response time)

Rescue effectiveness (number of “saves” versus number of casualties)

False alarms (number of false alarms)

Overall:

Citizen satisfaction (percent of population rating fire protection services as satisfactory)

International City Management Association (1999)

Service Area Descriptors

Primary population served

Square miles served

Service area descriptors

Median age of structures

Demographic characteristics

Median household income

Percentage below poverty level

Median age of population

Number of population

Service Provider Descriptors:

Total operating expenditures

Services provided

Number of stations

Staff by type (sworn, civilian)

Fire Suppression:

Total responses to fire calls

Fire calls responded to within 5 minutes

Structure fires by outcome

Fire fighter fire related injuries

Fire fighter fire related deaths

Civilian fire related injuries

Civilian fire related deaths

Special operations

Community Risk Reduction:

Total hazards within reporting period

Total inspected occupancies

Percent of fires in previously inspected occupancies

Percent of total inspected occupancies experiencing fires

Total dollar value lost to fire

Cost of community risk reduction efforts

Structure fires by occupancy type

Deaths by occupancy type

Arson fires

Hatry, Fountain, Sullivan, and Kremer (1991)

Recommended SEA Indicators for Fire Departments: Overall Performance

Inputs:

Total operating expenditures

Total capital expenditures

Personnel (full-time, part-time, and volunteer and total labor hours worked)

Outputs:

Population served (residential, workforce, tourist)

Property value protected (residential, commercial, public property)

Outcomes

Percent of citizens rating performance “satisfactory”

ISO fire insurance rating

Total dollars in fire losses

Total fire related deaths

Total fire related injuries

Areas of responsibility (area served and population density, compared to peer group cities)

Fire code compliance (percent of buildings in compliance with fire codes for municipality and peer group cities)

Other factors (climate, rainfall, social disturbances, road conditions, structural conditions, average age of buildings)

Recommended SEA Indicators for Fire Departments: Fire Prevention

Inputs:

Personnel (full time, part time and volunteer, and total labor hours worked)

Total operating expenditures

Total capital expenditures

Outputs:

Number of inspections

Number of education programs offered

Number of fire investigations performed

Number of fires (reported, unreported)

Percentage of fires preventable by education or inspection

Number of fires of suspicious origin

Fire in inspected versus uninspected buildings (industrial, other)

Citizens participating in or aware of education programs

Efficiency:

Expenditures per capita

Expenditures per \$100,000 of property protected

Schaenman and Schwartz (1974)

Output Indicators:

Reported fire incident rates (per 1,000 population, residential and commercial per 1,000 occupancies, incendiary and suspicious fires per 1,000 population, fires in inspected properties per 1,000 population, unreported fire per 1,000 population)

Fire suppression effectiveness (dollar loss per building fire, spread of fire after arrival of first unit, response time)

Overall fire protection effectiveness (insurance ratings, fire related deaths and injuries, property loss per \$1,000 property protected)

Workload handled (service calls by type of call, calls per company, number and rate of fire prevention inspections, population protected, property protected)

Input Measures:

Fire department expenditures (total, fire prevention, fire suppression)

Paid full-time fire protection personnel

Volunteer and part-time personnel

Conditioning Factors-Community Characteristics:

Climate and weather

Area

Population and population density

Land use

Structural conditions

Road and traffic conditions

Socioeconomic and demographic characteristics

Civil disturbances

Private fire protection measures

Characteristics of Fire Department and Water Supply

Apparatus

Fire stations

Staffing

Type and size of response to first and higher alarms

Alarm and dispatch system

Water supply (insurance rating or equivalent)

APPENDIX B: STATISTICAL SPREADSHEETS

City, State	Population	Area	Unif. Pers.	Civ. Pers.	Tot. Pers.	Total Alarms
Greensboro, NC	197,910	109	351	14	365	16,136
Montgomery, AL	197,014	157	417	22	439	23,091
Scottsdale, AZ	195,394	187	150	45	195	15,000
Huntington Beach, CA	195,316	28	139	37	176	11,202
Richmond, VA	194,173	62.5	416	9	425	25,124
Glendale, AZ	193,482	60	152	13	165	14,622
Garland, TX	193,408	57	221	9	230	15,583
Des Moines, IA	191,293	78	275	9	284	14,785
Lubbock, TX	190,974	104	235	9	244	5,068
Jackson, MS	188,419	115	447	25	472	9,779
San Bernadino, CA	186,402	59	146	22	168	18,253
Fort Wayne, IN	185,716	76	286	12	298	12,550
Grand Rapids, MI	185,437	44	260	0	260	15,514
Glendale, CA	185,086	31	166	33	199	10,247
Spokane, WA	184,058	59	318	26	344	20,580
Modesto, CA	182,016	35	153	0	153	13,951
Tacoma, WA	179,814	60	412	0	412	nr
Newport News, VA	178,615	64	331	18	349	25,913
Irving, TX	178,253	69	272	9	281	12,573
Little Rock, AR	175,303	118	387	6	393	16,667
Amarillo, TX	171,207	88	214	11	225	7,788
Tempe, AZ	167,622	40	137	19	156	12,783
Dayton, OH	167,475	56	400	34	434	33,087
Knoxville, TN	165,540	100	358	15	373	27,102
Winston-Salem, NC	164,316	108	254	12	266	8,628
Reno, NV	163,334	57	225	10	235	15,208
Boise, ID	157,452	64	202	0	202	10,146
Oxnard, CA	154,622	26	75	3	78	9,717
Fort Lauderdale, FL	153,728	33	292	92	384	31,271
Durham, NC	153,513	92	250	0	250	12,469
Oceanside, CA	153,367	42	97	30	127	9,433
Garden Grove, CA	151,264	18	94	4	98	10,835
Averages						
SLC '97	174,348	110	319	36	355	24245
Index						

Structures	Haz-mat	EMS	Civ. Death	Civ. Inj.	Fire Loss	Stations	Engines	Trks/Quints
385	413	10,208	2	Nr	3,699,566	16	16	7
389	148	17,714	1	39	3,234,031	14	15	6
462	382	12,000	0	0	965,540	8	8	2
101	337	7,022	0	5	2,108,645	7	Nr	nr
nr	Nr	16,643	5	35	6,912,185	20	0	20
124	64	11,682	0	1	3,681,085	7	8	1
418	413	11,519	2	45	3,415,686	8	10	3
391	11	11,828	0	40	3,978,832	9	10	5
339	506	275	0	5	3,234,031	13	12	3
853	209	4,300	8	0	9,537,895	22	14	6
293	58	14,242	3	7	8,036,447	11	11	2
542	593	5,920	0	27	nr	12	12	3
460	25	8,794	0	39	8,402,811	11	12	4
123	381	5,562	1	7	3,833,594	9	9	3
229	22	16,003	3	25	6,241,240	14	14	3
436	39	7,860	6	23	5,869,400	10	11	2
nr	Nr	nr	nr	Nr	Nr	18	17	5
369	310	3,881	1	34	3,656,951	9	13	6
312	143	6,906	4	5	6,917,115	11	11	4
1317	122	10,736	1	13	7,349,260	11	11	2
319	284	5,060	3	33	6,833,866	12	14	4
nr	Nr	9,707	1	Nr	2,027,820	6	7	2
695	364	21,035	0	67	3,883,038	14	14	5
nr	756	9,949	9	Nr	2,520,850	18	17	5
438	1192	934	1	34	5,089,097	17	17	3
432	254	9,294	0	Nr	Nr	10	10	3
331	215	7,515	3	9	3,349,197	12	12	2
223	Nr	4,587	0	10	Nr	6	5	
369	162	22,246	4	61	5,777,698	12	11	3
nr	Nr	7,563	0	4	Nr	12	14	4
136	335	6,158	0	2	1,400,000	7	7	2
81	Nr	5,697	0	2	3,202,097	7	7	
258	790	17390	0	25	4091704	13	12	3

On-Duty	Min. On-Duty	Pop/FF	Pop/On-Duty	Pop/Min	Pop/Sta	Pop/App	Land/100FF
109	84	564	1,816	2,356	12,369	8,605	31
111	94	472	1,775	2,096	14,072	9,382	38
52	52	1,303	3,758	3,758	24,424	19,539	125
41	41	1,405	4,764	4,764	27,902		20
102	96	467	1,904	2,023	9,709	9,709	15
38	38	1,273	5,092	5,092	27,640	21,498	39
56	56	875	3,454	3,454	24,176	14,878	26
84	NR	696	2,277		21,255	12,753	28
59	59	813	3,237	3,237	14,690	12,732	44
124	101	422	1,520	1,866	8,565	9,421	26
47	47	1,277	3,966	3,966	16,946	14,339	40
67	67	649	2,772	2,772	15,476	12,381	27
59	59	713	3,143	3,143	16,858	11,590	17
50	50	1,115	3,702	3,702	20,565	15,424	19
70	70	579	2,629	2,629	13,147	10,827	19
40	40	1,190	4,550	4,550	18,202	14,001	23
77	77	436	2,335	2,335	9,990	8,173	15
102	83	540	1,751	2,152	19,846	9,401	19
58	58	655	3,073	3,073	16,205	11,884	25
47	47	453	3,730	3,730	15,937	13,485	30
70	60	800	2,446	2,853	14,267	9,512	41
43	39	1,224	3,898	4,298	27,937	18,625	29
NR	NR	419			11,963	8,814	14
113	88	462	1,465	1,881	9,197	7,525	28
82	62	647	2,004	2,650	9,666	8,216	43
61	56	726	2,678	2,917	16,333	12,564	25
48	47	779	3,280	3,350	13,121	11,247	32
23	23	2,062	6,723	6,723	25,770		35
62	62	526	2,479	2,479	12,811	10,981	11
70	60	614	2,193	2,559	12,793	8,529	37
34	30	1,581	4,511	5,112	21,910	17,041	43
29	29	1,609	5,216	5,216	21,609		19
		855	3,166	3,358	17,042	12,175	31
74	64	547	2356	2724	13411	11623	34
		0.64	0.74	0.81	0.79	0.95	1.12

Land/100On-Duty	Land/100Min.	Land/Sta.	Land/App	Alarms/1000Pop	Structures/1000Pop
100	130	6.8	4.7	82	1.95
141	167	11.2	7.5	117	1.97
360	360	23.4	18.7	77	2.36
68	68	4.0		57	0.52
61	65	3.1	3.1	129	
158	158	8.6	6.7	76	0.64
102	102	7.1	4.4	81	2.16
93		8.7	5.2	77	2.04
176	176	8.0	6.9	27	1.78
93	114	5.2	5.8	52	4.53
126	126	5.4	4.5	98	1.57
113	113	6.3	5.1	68	2.92
75	75	4.0	2.8	84	2.48
62	62	3.4	2.6	55	0.66
84	84	4.2	3.5	112	1.24
88	88	3.5	2.7	77	2.40
78	78	3.3	2.7		
63	77	7.1	3.4	145	2.07
119	119	6.3	4.6	71	1.75
251	251	10.7	9.1	95	7.51
126	147	7.3	4.9	45	1.86
93	103	6.7	4.4	76	
		4.0	2.9	198	4.15
88	114	5.6	4.5	164	
132	174	6.4	5.4	53	2.67
93	102	5.7	4.4	93	2.64
133	136	5.3	4.6	64	2.10
113	113	4.3		63	1.44
53	53	2.8	2.4	203	2.40
131	153	7.7	5.1	81	
124	140	6.0	4.7	62	0.89
62	62	2.6		72	0.54
115	124	6.4	5.1	89	2.19
149	172	8.5	7.3	139	1.5
1.29	1.39	1.32	1.45	1.57	0.67

EMS/1000	Alarms/FF	Alarms/On-Duty	Alarms/Min.	Alarms/Sta.	Alarms/App	Structures/FF
52	46	148	192	1,009	702	1.10
90	55	208	246	1,649	1,100	0.93
61	100	288	288	1,875	1,500	3.08
36	81	273	273	1,600		0.73
86	60	246	262	1,256	1,256	
60	96	385	385	2,089	1,625	0.82
60	71	278	278	1,948	1,199	1.89
62	54	176		1,643	986	1.42
1	22	86	86	390	338	1.44
23	22	79	97	445	489	1.91
76	125	388	388	1,659	1,404	2.01
32	44	187	187	1,046	837	1.90
47	60	263	263	1,410	970	1.77
30	62	205	205	1,139	854	0.74
87	65	294	294	1,470	1,211	0.72
43	91	349	349	1,395	1,073	2.85
22	78	254	312	2,879	1,364	1.11
39	46	217	217	1,143	838	1.15
61	43	355	355	1,515	1,282	3.40
30	36	111	130	649	433	1.49
58	93	297	328	2,131	1,420	
126	83			2,363	1,741	1.74
60	76	240	308	1,506	1,232	
6	34	105	139	508	431	1.72
57	68	249	272	1,521	1,170	1.92
48	50	211	216	846	725	1.64
30	130	422	422	1,620		2.97
145	107	504	504	2,606	2,234	1.26
49	50	178	208	1,039	693	
40	97	277	314	1,348	1,048	1.40
38	115	374	374	1,548		0.86
53	70	255	272	1,459	1,077	1.63
100	76	328	379	1865	1616	0.81
1.87	1.09	1.28	1.39	1.28	1.50	0.50

Structures/On-Duty	Structues/min.	Structures/Sta.	Structues/App	EMS/FF	EMS/On-Duty
3.53	4.58	24	17	29	94
3.50	4.14	28	19	42	160
8.88	8.88	58	46	80	231
2.46	2.46	14		51	171
				40	163
3.26	3.26	18	14	77	307
7.46	7.46	52	32	52	206
4.65		43	26	43	141
5.75	5.75	26	23	1	5
6.88	8.45	39	43	10	35
6.23	6.23	27	23	98	303
8.09	8.09	45	36	21	88
7.80	7.80	42	29	34	149
2.46	2.46	14	10	34	111
3.27	3.27	16	13	50	229
10.90	10.90	44	34	51	197
3.62	4.45	41	19	12	38
5.38	5.38	28	21	25	119
28.02	28.02	120	101	28	228
4.56	5.32	27	18	24	72
				71	226
		50	37	53	
				28	88
5.34	7.06	26	22	4	11
7.08	7.71	43	33	41	152
6.90	7.04	28	24	37	157
9.70	9.70	37		61	199
5.95	5.95	31	26	76	359
				30	108
4.00	4.53	19	15	63	181
2.79	2.79	12		61	196
6.48	6.87	35	28	43	157
3.49	4.03	20	17	55	235
1.86	1.70	1.77	1.65	0.78	0.67

EMS/Min	EMS/Sta.	EMS/App	Alarms/1000Pop	Structures/1000 Pop	EMS/1000Pop
122	638	444	82	1.9	52
188	1265	844	117	2.0	90
231	1500	1200	77	2.4	61
171	1003		57	0.5	36
173	832	832	129		86
307	1669	1298	76	0.6	60
206	1440	886	81	2.2	60
	1314	789	77	2.0	62
5	21	18	27	1.8	1
43	195	215	52	4.5	23
303	1295	1096	98	1.6	76
88	493	395	68	2.9	32
149	799	550	84	2.5	47
111	618	464	55	0.7	30
229	1143	941	112	1.2	87
197	786	605	77	2.4	43
47	431	204	145	2.1	22
119	628	460	71	1.8	39
228	976	826	95	7.5	61
84	422	281	45	1.9	30
249	1618	1079	76		58
	1503	1107	198	4.1	126
113	553	452	164		60
15	55	47	53	2.7	6
166	929	715	93	2.6	57
160	626	537	64	2.1	48
199	765		63	1.4	30
359	1854	1589	203	2.4	145
126	630	420	81		49
205	880	684	62	0.9	40
196	814		72	0.5	38
165	893	678	89	2.2	53
272	1338	1159	139	1.5	100
0.61	0.67	0.58	0.64	1.48	0.53

Deaths/100KPop	Inj/100KPop	Loss/Capita	Housing#	Mfgr#	Whlsale#	Retail#	Service#
1.01		18.69	80,411	396	742	2,281	1,867
0.51	20	16.42	76,636	219	436	1,765	1,447
0.00	0	4.94	69,028	226	374	1,890	1,940
0.00	3	10.80	72,736	432	382	1,839	1,337
2.58	18	35.60	94,141	428	696	2,256	2,414
0.00	1	19.03	61,218	122	144	1,136	741
1.03	23	17.66	65,595	359	293	1,476	968
0.00	21	20.80	83,289	272	577	2,069	1,726
0.00	3	16.93	77,582	226	541	2,166	1,483
4.25	0	50.62	79,374	220	603	2,184	1,827
1.61	4	43.11	58,804	144	211	1,457	1,168
0.00	15		77,166	357	607	2,070	1,695
0.00	21	45.31	73,716	489	577	1,677	1,618
0.54	4	20.71	72,114	316	328	1,944	1,621
1.63	14	33.91	79,875	323	573	2,015	1,880
3.30	13	32.25	60,878	145	213	1,529	1,222
			75,147	339	362	1,616	1,539
0.56	19	20.47	69,728	117	162	1,265	1,008
2.24	3	38.81	71,059	266	475	1,529	1,181
0.57	7	41.92	80,995	265	637	2,172	2,203
1.75	19	39.92	68,592	160	426	2,151	1,304
0.60		12.10	61,452	416	507	1,266	1,309
0.00	40	23.19	80,370	466	401	1,277	1,443
5.44		15.23	76,453	332	753	2,877	2,142
0.61	21	30.97	65,631	234	393	2,009	1,415
0.00			61,384	162	275	1,570	1,879
1.91	6	21.27	53,271	189	420	1,503	1,434
0.00	6		41,247	93	138	1,012	719
2.60	40	37.58	81,268	407	701	2,593	2,874
0.00	3		60,607	131	185	1,307	993
0.00	1	9.13	51,109	115	80	830	517
0.00	1	21.17	45,984	241	261	1,356	872
1.06	12	25.87					
0	14	23.47	73,762	576	1,047	2,270	2,787
#DIV/0!	0.84	1.10					

MfgrVal	Whlsale\$	Retail\$	Service\$	Hous/On-Duty	Hous/App	House/Sta	House/Unif.
3,679.9	4353.8	2042.0	849.2	849.2	3496.1	5,025.7	229.1
1313.9	2260.0	1468.9	612.0	612.0	3649.3	5,474.0	183.8
552.8	776.7	1551.9	764.4	764.4	6902.8	8,628.5	460.2
1550.8	1398.7	1301.4	541.8	541.8		10,390.9	523.3
8280.8	4791.8	1945.0	1561.4	1561.4	4707.1	4,707.1	226.3
518.1	370.3	992.0	191.4	191.4	6802.0	8,745.4	402.8
2083.9	789.2	875.1	308.0	308.0	5045.8	8,199.4	296.8
3097.7	2754.7	1619.2	965.5	965.5	5552.6	9,254.3	302.9
822.4	2612.9	1551.2	580.4	580.4	5172.1	5,967.8	330.1
1252.6	2557.5	n/a	821.5	821.5	3968.7	3,607.9	177.6
425.6	965.5	1442.3	503.6	503.6	4523.4	5,345.8	402.8
2887.7	4782.7	1885.4	785.1	785.1	5144.4	6,430.5	269.8
3759.7	3148.5	1297.5	894.7	894.7	4607.3	6,701.5	283.5
832.5	1235.2	1482.4	840.9	840.9	6009.5	8,012.7	434.4
n/a	1816.1	1556.5	663.2	663.2	4698.5	5,705.4	251.2
1685.6	635.8	1257.8	541.4	541.4	4682.9	6,087.8	397.9
1866.8	2240.2	1430.8	632.5	632.5	3415.8	4,174.8	182.4
2037.4	498.2	1058.3	417.4	417.4	3669.9	7,747.6	210.7
1594.3	8573.3	1361.6	946.3	946.3	4737.3	6,459.9	261.2
1986.5	3161.6	1615.2	998.4	998.4	6230.4	7,363.2	209.3
1810.7	1763.5	1466.9	487.3	487.3	3810.7	5,716.0	320.5
1724.7	1729.8	1136.6	598.1	598.1	6828.0	10,242.0	448.6
3589.1	3099.5	1056.4	908.8	908.8	4230.0	5,740.7	200.9
1957.1	3129.0	2227.3	838.4	838.4	3475.1	4,247.4	213.6
5187.3	1328.6	1725.1	738.2	738.2	3281.6	3,860.6	258.4
431.5	1157.5	1496.9	1652.1	1652.1	4721.8	6,138.4	272.8
978.2	1476.8	969.2	516.2	516.2	3805.1	4,439.3	263.7
903.7	474.2	767.0	257.7	257.7		6,874.5	550.0
1064.4	3858.2	2576.3	1603.0	1603.0	5804.9	6,772.3	278.3
n/a	910.7	1052.2	357.9	357.9	3367.1	5,050.6	242.4
195	145.4	530.9	175.3	175.3	5678.8	7,301.3	526.9
829	1966.1	980.4	426.4	426.4		6,569.1	489.2
				718.1	4759.3	6468.2	315.7
3170.5	6279.1	1732.1	1513.8	1513.8	4917.5	5,674.0	231.2
				2.11	1.03	0.88	0.73

Estab/On-Duty	Estab/Unif.	Estab/App	Estab/Sta	\$/On-Duty	\$/Unif	\$/App	\$/Sta.
48.5	15.1	229.8	330.4	100.2	682.8	475.0	682.8
34.8	9.3	184.1	276.2	50.9	403.9	269.3	403.9
85.2	29.5	443.0	553.8	70.1	455.7	364.6	455.7
97.3	28.7		570.0	116.9	684.7		684.7
56.8	13.9	289.7	289.7	162.5	829.0	829.0	829.0
56.4	14.1	238.1	306.1	54.5	296.0	230.2	296.0
55.3	14.0	238.2	387.0	72.4	507.0	312.0	507.0
55.3	16.9	309.6	516.0	100.4	937.5	562.5	937.5
74.8	18.8	294.4	339.7	94.4	428.2	371.1	428.2
39.0	10.8	241.7	219.7				
63.4	20.4	229.2	270.9	71.0	303.4	256.7	303.4
70.6	16.5	315.3	394.1	154.3	861.7	689.4	861.7
73.9	16.8	272.6	396.5	154.2	827.3	568.8	827.3
84.2	25.4	350.8	467.7	87.8	487.9	365.9	487.9
68.4	15.1	281.8	342.2				
77.7	20.3	239.2	310.9	103.0	412.1	317.0	412.1
50.1	9.4	175.3	214.2	80.1	342.8	280.5	342.8
25.0	7.7	134.3	283.6	39.3	445.7	211.1	445.7
59.5	12.7	230.1	313.7	215.1	1,134.1	831.7	1,134.1
112.3	13.6	405.9	479.7	165.1	705.6	597.1	705.6
57.7	18.9	224.5	336.8	79.0	460.7	307.1	460.7
81.3	25.5	388.7	583.0	120.7	864.9	576.6	864.9
	9.0	188.8	256.2		618.1	455.5	618.1
54.0	17.1	277.5	339.1	72.1	452.9	370.5	452.9
49.4	15.9	202.6	238.3	109.5	528.2	449.0	528.2
63.7	17.3	298.9	388.6	77.7	473.8	364.5	473.8
73.9	17.6	253.3	295.5	82.1	328.4	281.5	328.4
85.3	26.2		327.0	104.5	400.4		400.4
106.0	22.5	469.6	547.9	146.8	758.5	650.1	758.5
37.4	10.5	145.3	218.0				
45.4	15.9	171.3	220.3	30.8	149.5	116.3	149.5
94.1	29.0		390.0	144.9	600.3		600.3
65.7	17.3	266.3	356.3	102.2	564.9	427.0	564.9
90.3	20.9	445.3	513.8	171.6	976.6	846.4	976.6
1.37	1.21	1.67	1.44	1.68	1.73	1.98	1.73

APPENDIX C: A PROPOSAL FOR ECONOMIC INDICATORS

APPENDIX C:

A PROPOSAL FOR USING ECONOMIC INDICATORS

One of the shortcomings of most fire department performance measurement systems is the lack of attention to the variety of economic activities that make up a city. This appendix contains a proposal for expanding the scope of fire department performance measures to include manufacturing, wholesale, retail, and taxable service activity. This remains only a proposal and is not included in the main body of this research report because of a lack of current data. The most recent data available to the author was found in *The City and County Data Book, 1994*, a US Census Bureau publication with results from the 1990 census. This data was more than a decade older than the data used in this research project. However, the author felt that a preliminary attempt to develop fire department performance measures based on economic activity was valuable, provided that it was clear that this was an exercise and that the results were not in any way to be considered valid.

The first step in the exercise was the compilation of economic data from *The City and County Data Book*. The raw data elements consisted of the number of manufacturing, wholesale, retail, and taxable service establishments, as well as the dollar volume of sales or receipts from these activities. The number of establishments was reported as a total for all four categories. The dollar value produced by each type of activity was also reported as a total. The number of housing units was also included. These data elements were entered into the statistical spreadsheet found in Appendix B. Calculations were performed that were similar to the calculations performed for efficiency and coverage ratios in the main body of this research report.

The results of this exercise appear in Table C-1. It is interesting to note that the index numbers all exceed 100, which indicates that the SLCFD “covers” significantly more establishments and dollars than the average for the other 32 cities. However, when the number of housing units is used, the index numbers drop below 100. If the SLCFD were to be assessed only on the residential sector, it would appear to have too many resources. An examination of the coverage of the economic sector would lead to the opposite conclusion. In some cases, the SLCFD’s resources are covering almost twice the average for the other 32 cities.

This methodology should be used when more current data become available. The results should more clearly reflect the characteristics of the community being served in a way that permits a comparison with other communities.

Table C-1

Proposed Economic Indicators for Fire Departments

	<u>Average</u>	<u>SLC</u>	<u>Index</u>
Housing units per on-duty fire fighter	718.1	1513.8	211
Housing units per major apparatus	4,759	4,918	103
Housing units per station	6,468	5,674	88
Housing units per uniformed staff	316	231	73
Establishments per on duty fire fighter	65.7	90.3	137
Establishments per major apparatus	266.3	445.3	167
Establishments per station	356.3	513.8	144
Establishments per uniformed staff	17.3	20.9	121
Dollar value per on-duty fire fighter	102.2	171.6	168
Dollar value per major apparatus	427.0	846.4	198
Dollar value per station	564.9	976.6	173
Dollar value per uniformed staff	26.6	39.8	149